## Space Weather Forecast

Issued on Sunday, 09 October 2022 at 13:09 Local

**This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales**

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**Space Weather Forecast Headline: Chance of Moderate-class X-ray flares.**

**Analysis of Space Weather Activity over past 24 hours**

**Solar Activity:** Solar activity was Low with any flares remaining at common class. There are six sunspot regions on the Earth-facing disc. The largest, and most complex region is now traversing the northwest disc, but has persisted as a relatively stable area. It has seen some limited spot development amongst its intermediate spots. A further spot to the north of the large one is a smaller and also relatively stable region, but this was the source of the most recent Moderate flare which occurred on the 7th. Another spot region in the northeast disc has exhibited some growth in areal extent during the last 24 hours, but remains a relatively simple, and small region. The other regions are either small or decaying.

No Earth-directed CMEs (coronal mass ejections) were observed. A CME associated with a filament eruption from the southeast quadrant from around 09/0130 UTC is being modelled, but initial assessment is that no Earth directed component is likely.

**Solar Wind / Geomagnetic Activity:** The solar wind persisted at mainly elevated levels, with speeds gradually rising from around 500 km/s to around 570 km/s. The strength of the magnetic field remained weak, with the north-south component variable, but more frequently weakly negatively (southward) pointed rather than weakly positive (northward). Geomagnetic activity was Quite to Unsettled (Kp 2 to 3) until midnight UTC, then occasionally Active (Kp 4).

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) remained at background with no solar radiation storms occurring.

**Four-Day Space Weather Forecast Summary**

**Solar Activity:** Solar activity is forecast to be Low with a chance of rising to Moderate with any M-flares. There is an ongoing slight chance of rising to High due to the potential of the large sunspot producing an isolated X-flare.

**Solar Wind / Geomagnetic Activity:** There are no Earth-directed CMEs, however one may pass close to the Earth either late day 3 or early day 4 (11th or 12th), giving some very slight peripheral influences. Otherwise, ongoing fast winds are likely to only gradually ease through the period, approaching or falling to background day 4 (12th). Geomagnetic activity is forecast to be mostly Quiet to Unsettled. Further Active intervals are possible day 1 and perhaps day 2 (9th and 10th), with a slight chance of G1-Minor Storms day 1 (9th).

**Energetic Particles / Solar Radiation:** The count rate of energetic particles (high energy protons) has the potential to rise due to any significant flaring that occurs, especially from the large sunspot on the disc. This has a slight chance of reaching the S1/Minor Radiation Storm level.

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**Geomagnetic Storms:**

| Geo-Magnetic Storm / Probability (Exceedance) | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Minor or Moderate | G1 to G2 | No | 10 | 1 | 5 | 5 |
| Strong | G3 | No | 1 | 1 | 1 | 1 |
| Severe | G4 | No | 1 | 1 | 1 | 1 |
| Extreme | G5 | No | 1 | 1 | 1 | 1 |

**Radio Blackouts - X Ray Flares:**

| X Ray Flares / Probability | Level | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | R1-R2 M Class | No | 40 | 40 | 40 | 40 |
| Very Active | R3 to R5 X | No | 10 | 10 | 10 | 10 |

**Solar Radiation Storms - (High Energy Protons):**

| Radiation Storms / Probability (Exceedance) | Level ($cm^{-2}$ $sr^{-1}$ $s^{-1}$) | Past 24 Hours (Yes/No) | Day 1 (00-24 UTC) (%) | Day 2 (00-24 UTC) (%) | Day 3 (00-24 UTC) (%) | Day 4 (00-24 UTC) (%) |
|---|---|---|---|---|---|---|
| Active | ≥ S1 | No | 5 | 5 | 5 | 5 |
| Very Active | ≥ S3 * | No | 1 | 1 | 1 | 1 |

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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